

CDMA2000 Benefits and Market Status

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Introduction

1. What is 3G?

- According to ITU, 3G should provide:
 - 144Kbit/s high mobility (vehicular) data transmission
 - 384Kbit/s low mobility (pedestrian) data transmission
 - 2Mbit/s stationary (untethered) wireless data transmission
- The ITU also identified the following bands for IMT-2000 3rd generation services:
 - 806 – 960 Mhz
 - 1710 – 1885 Mhz
 - 1885 – 2025 Mhz
 - 2110 – 2200 Mhz
 - 2500 – 2690 Mhz
- ITU announced In 2000 that any country may license 3G technology in any other frequency band that is allocated to mobile services.

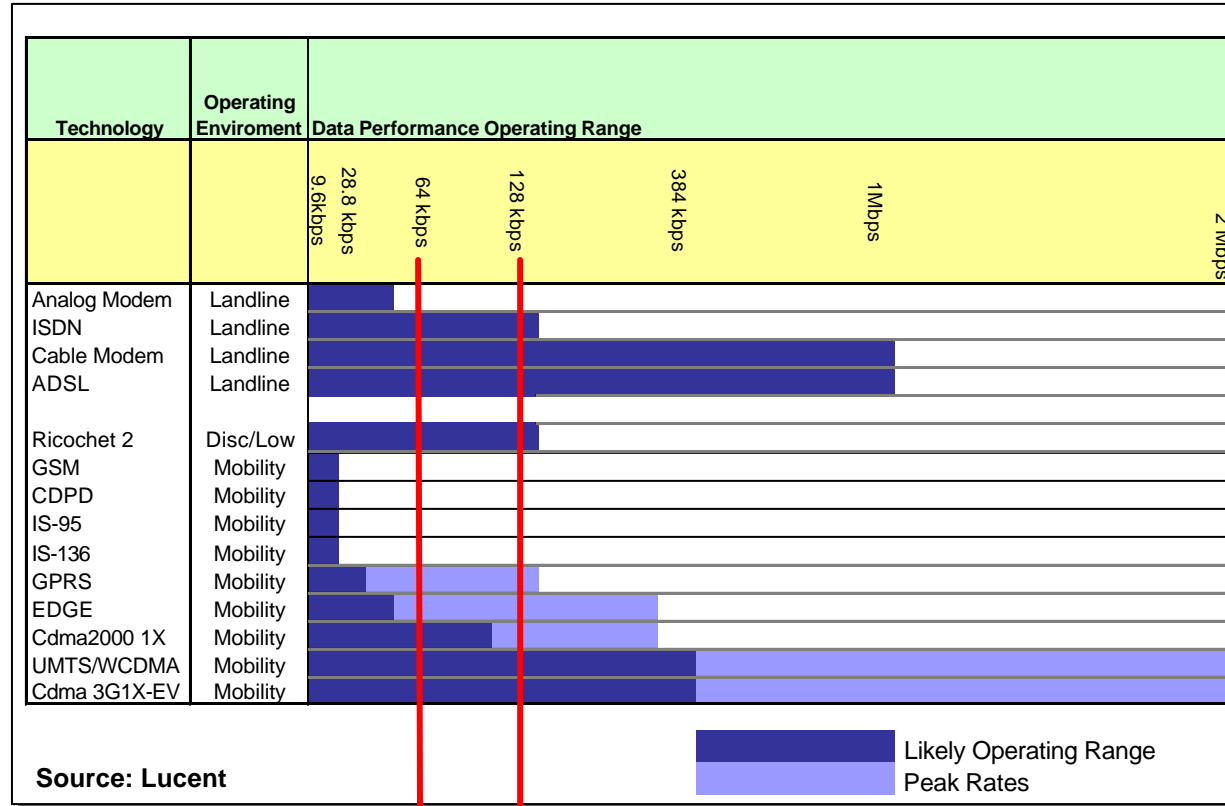


Why are Data Speeds Important?

-2G data solutions are too slow for business applications

-Current business applications would require substantial engineering to be effective in the current mobile environment

-Existing terminals have limitations for data applications (screen sizes, etc.)



Minimum Data Throughput Performance (US Study)
 Minimum Data Throughput Performance (Europe Study)

Spread Spectrum (CDMA/UMTS) are the only air interfaces that can deliver the bandwidth and throughput needed for today's enterprise applications while relieving capacity on the 1G/2G networks.

A number of factors are driving the wireless Internet and wireless information...

1. Societal trends

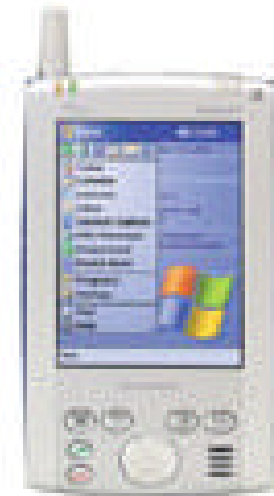
- Emerging computer literate society
- Increasing travel and mobility

2. Technology enablers

- High speed, cost effective mobile systems
- Integrated multimedia applications
- Small, powerful, application-rich user devices

3. Market trends

- Rapid growth in mobile
- Rapid Internet adoption
- Accelerating pace of electronic commerce (aka M-commerce)
- Rapid growth of portable and palmtop computers










Development challenges...

1. IMT-2000 Challenges for developing economies...

- Combined cost of IMT-2000 licenses and infrastructure
- Competition with more developed economies for financing
- Need to support rural, sparsely populated areas
- Salvaging recent investments made in 1G and 2G mobile systems



Certain factors are critical for making 3G a success

-  Solutions that are globally recognized and meet adopted, international standards
-  Solutions that work, enable quick time-to-market, and meet industry expectations
-  Spectrum flexibility, efficiency, and cost
-  Capacity to meet future demand
-  Seamless and cost effective migration from today's systems
-  Broad range of competitively-priced products for end-users (consumers, enterprises)
-  Broad range of applications for end-users



CDMA2000 addresses each of these success factors

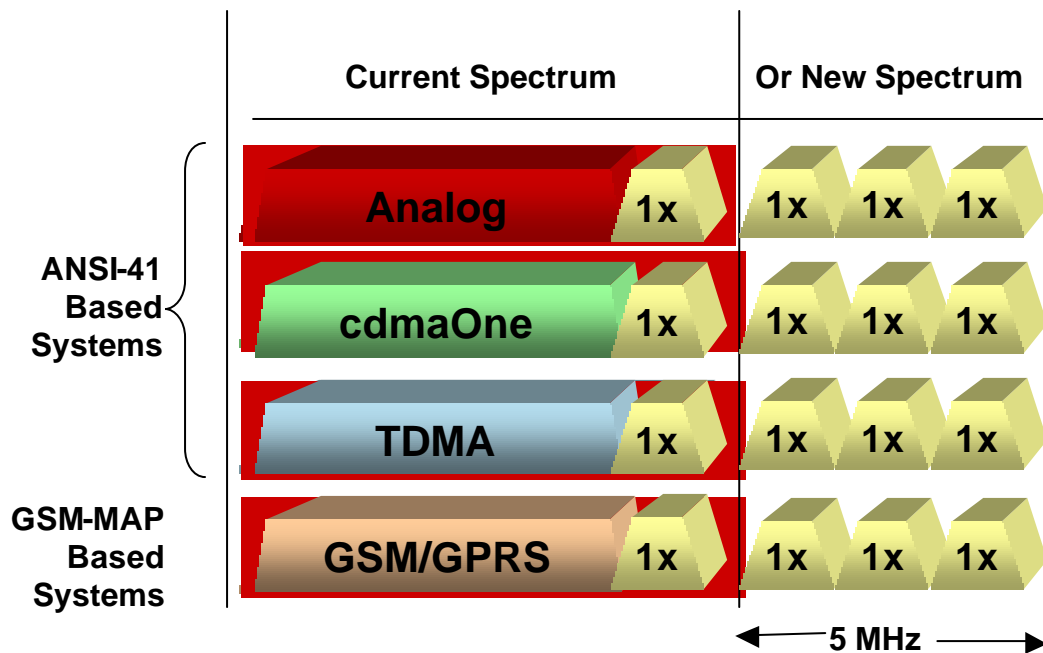
Spectrum flexibility is a key consideration for any technology...

1. CDMA2000 3G services in a small amount of spectrum

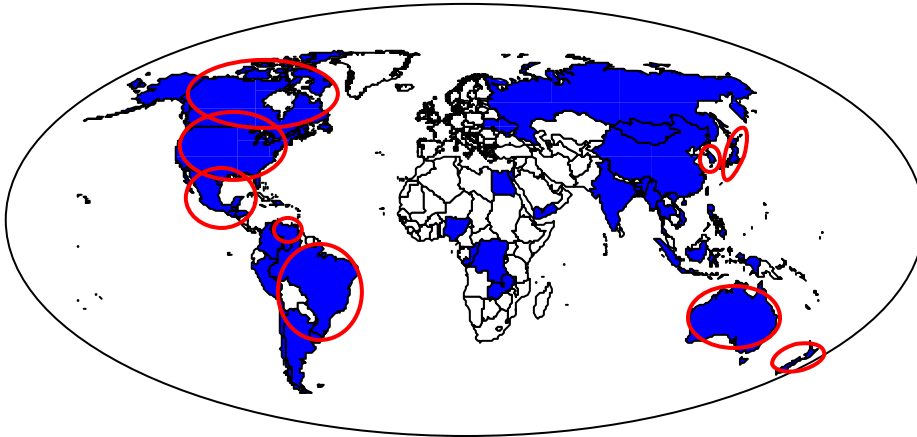
- Effective use of spectrum, significant to ALL operators
- Effective both in overlay or greenfield deployments

CDMA2000 is not constrained to only the IMT-2000 band. Defined to operate in existing and IMT spectrum:

- 450 MHz
- 700 MHz
- 800 MHz
- 900 MHz
- 1700 MHz
- 1800 MHz
- 1900 MHz
- 2100 MHz



Going forward, addressable population will be a key driver of technology market share

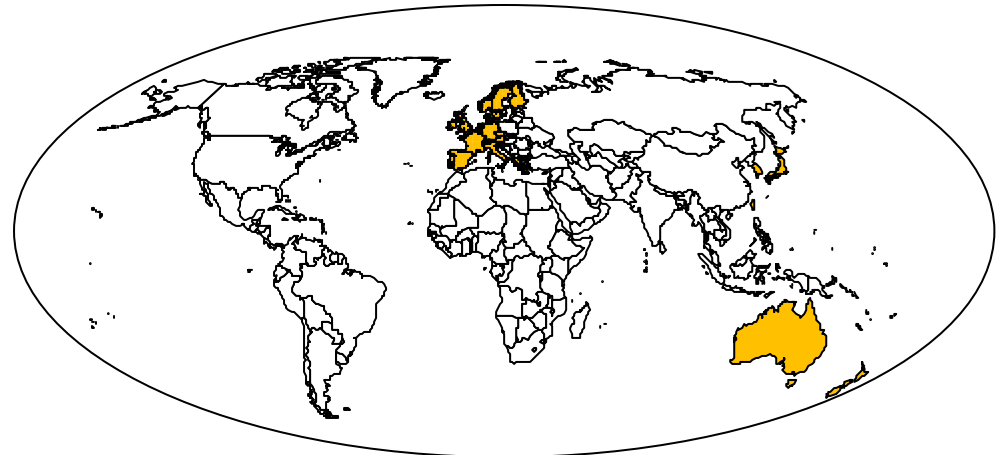


Countries able to deploy CDMA2000 in existing **cdmaOne** networks represent **over 4.428 billion** pops

Countries announcing CDMA2000 deployments represent **2.168 billion** pops

- Countries with Commercial CDMA Networks
- Countries with CDMA2000 Networks, Plans or Trials

Countries that have awarded UMTS spectrum at 2.1 GHz represent only **617 Million** pops



- Countries with **UMTS** Licensed Spectrum at 2.1 GHz

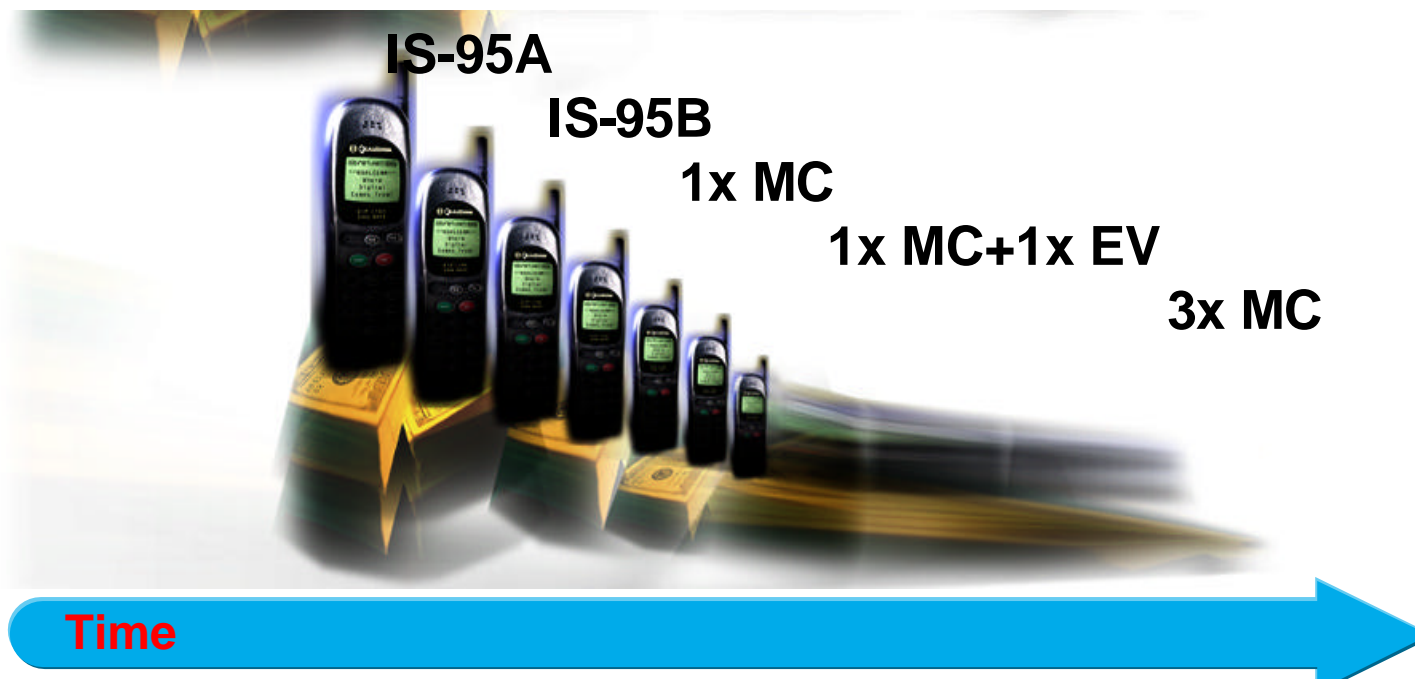
Advantages of CDMA2000 @ any Frequency

1. CDMA2000 1x allows for unparalleled voice capacity of up to 26 erlangs per sector/carrier.
2. CDMA2000 1x allows for current realized data speeds of 153Kbps increasing to 307 Kbps
3. 1xEV:DO (HDR): is a dedicated channel which will have peak speeds of 2.4 Mbps and has 5 times the data traffic capability.
4. The upgrade to 1xEV:DO does not require new spectrum or new base stations.
 - Rather, it can be implemented by adding channel cards and software to existing base stations.
 - It is the most cost effective solution available.



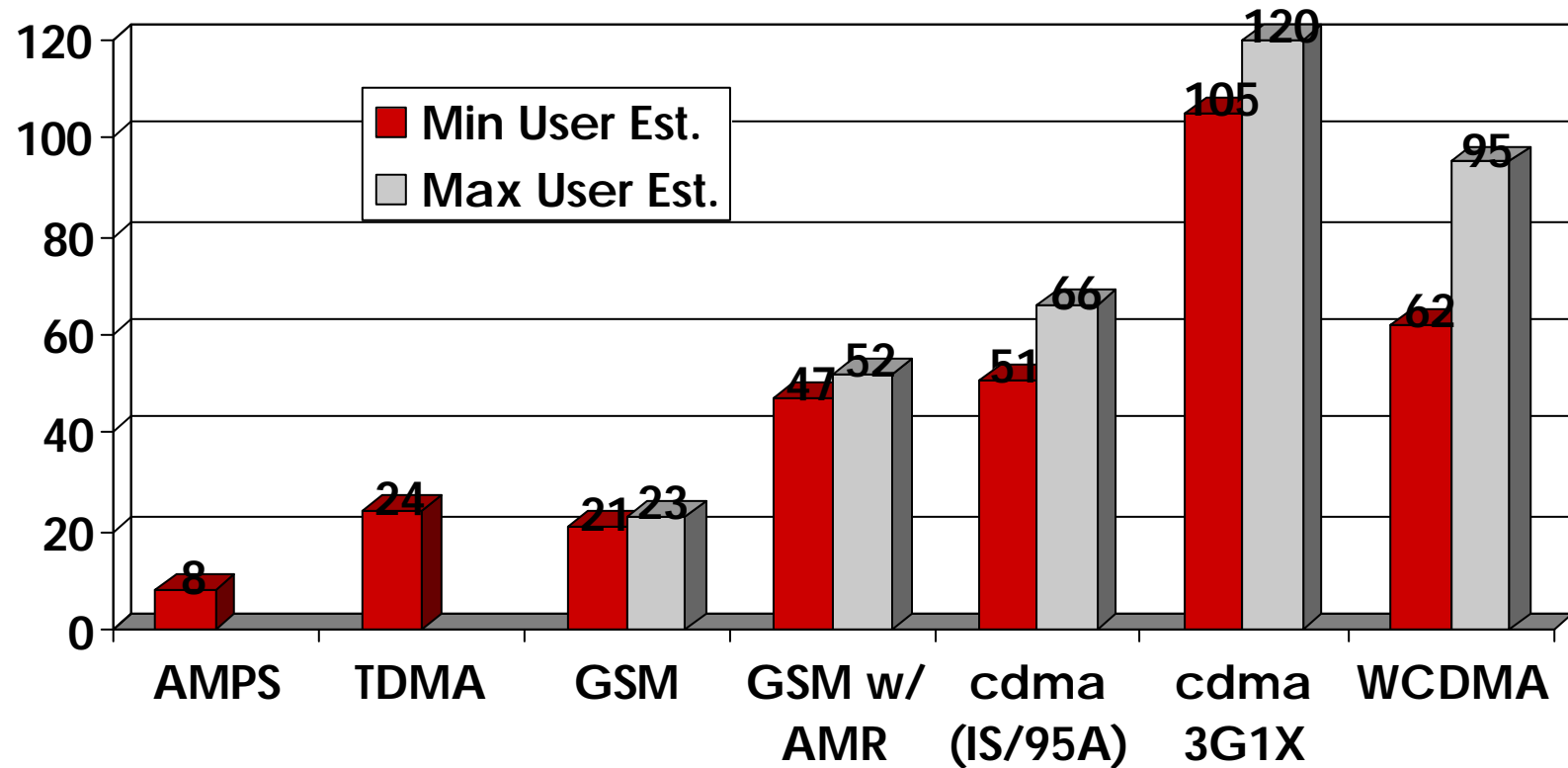
Terminal Compatibility

CDMA/CDMA2000



CDMA/CDMA2000 phones are forward and backward compatible. This is unique to CDMA/CDMA2000 Technology

Voice Capacity per 5MHz of Spectrum



Source: Deutsche Bank Alex. Brown estimates from various sources, "The Rise of the 3G Empire," Sept. 2001.



Why is CDMA2000 so successful?

CDMA2000 handsets are readily available and relatively inexpensive compared to other 3G devices

Devices available today

1. Over 100 handset models
2. More than 20 other devices such as PDAs, modem cards
3. Color displays, MP3 players and cameras, supporting high-speed data access
4. CDMA2000 devices are backward compatible with cdmaOne devices

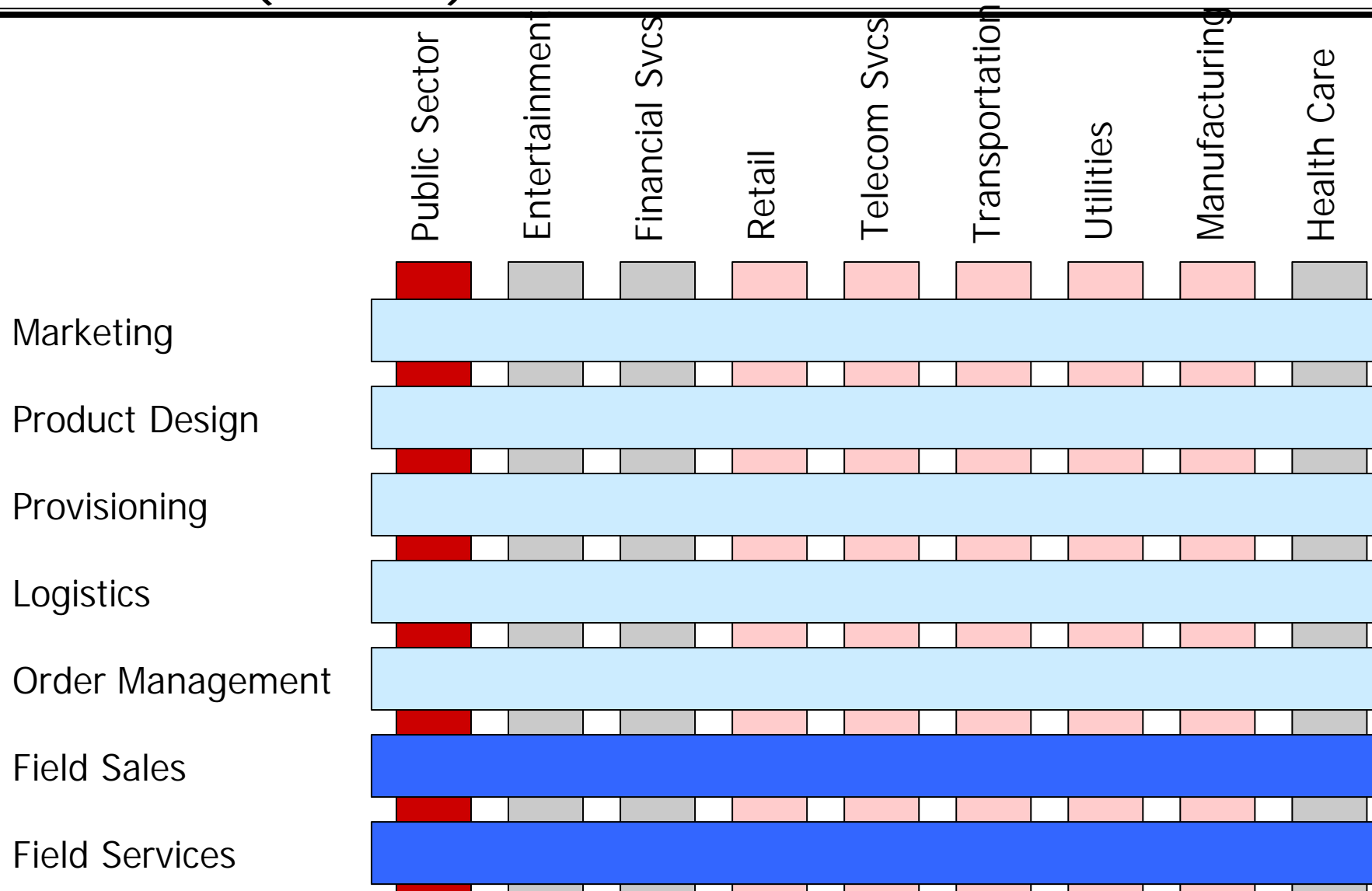


Handset pricing and performance

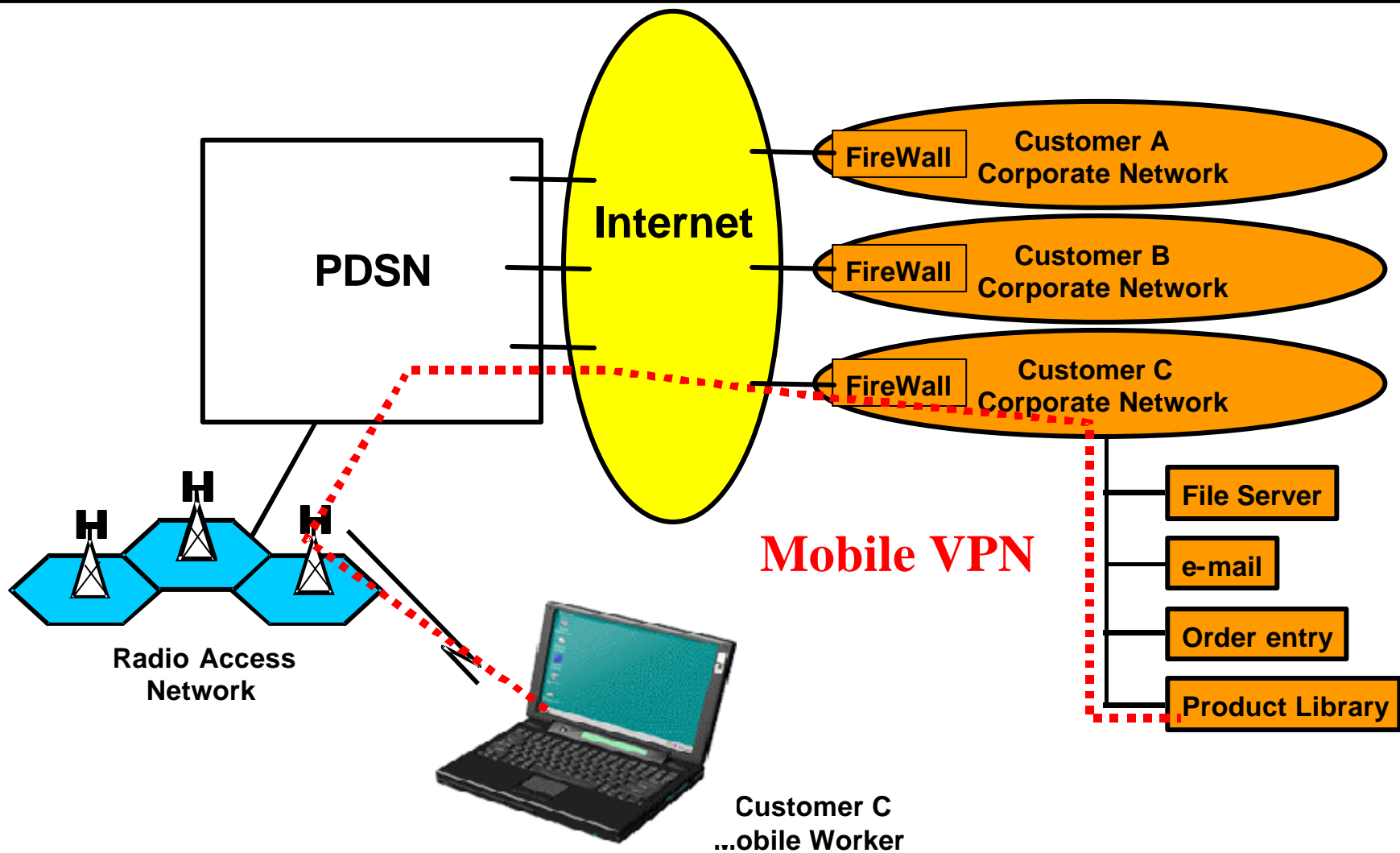
	CDMA2000 1X (SKT, KTF)	CDMA2000 1xEV-DO (SKT, KTF)	W-CDMA (DoCoMo)
Wholesale price	\$200-400	\$400-500	\$600-\$750
Speed (kbps)			
Maximum	144	2400	64-384
Average	100-120	400-800	80-90
Battery life	250 hours	N/A	55 hours



Who will benefit most from Secure Mobile Data Solutions (SMDS)?



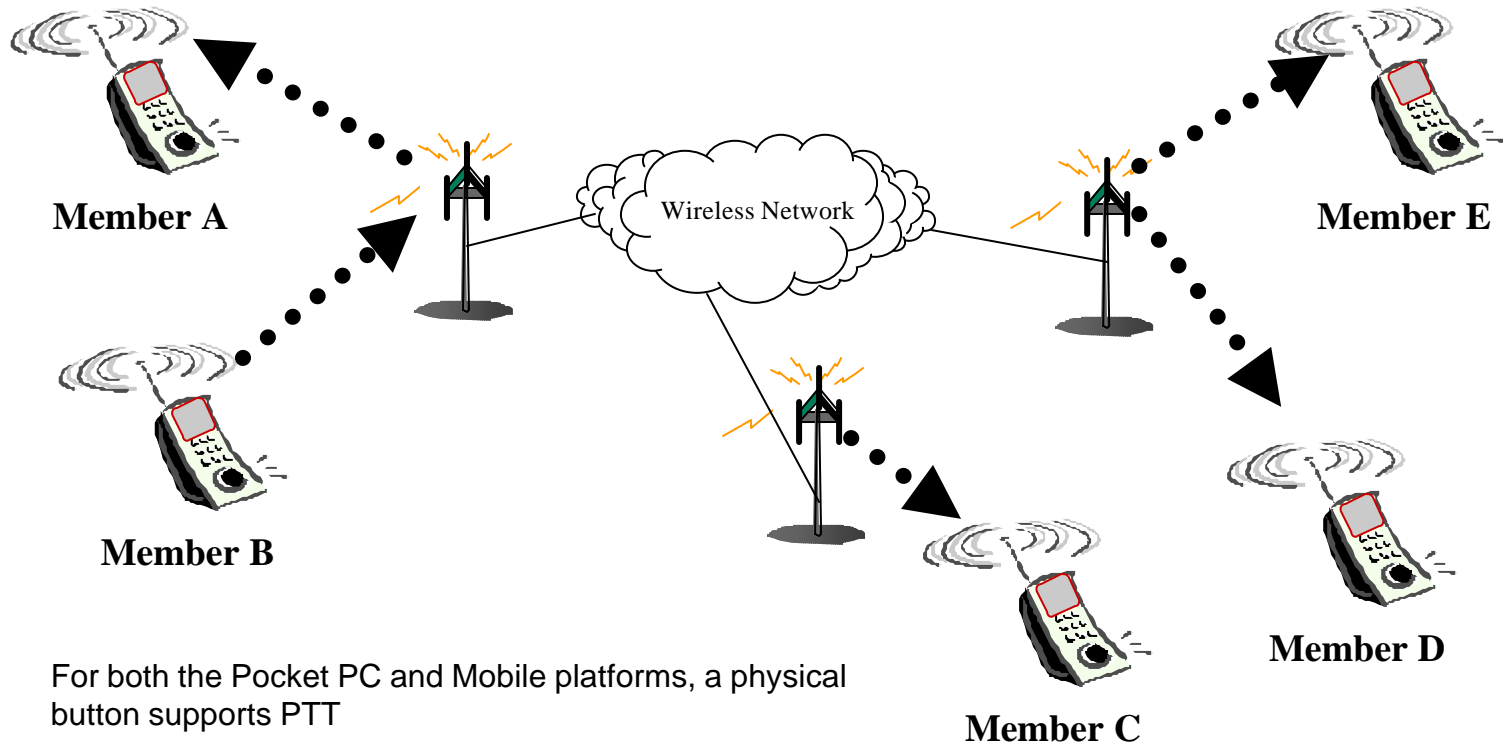
Mobile VPN – SECURE End to End Solution for Enterprises



Mobile VPN

What is Push To Talk (PTT)?

1. Half Duplex point-to-point (private) and point-to-multipoint (group) calls across wireless service coverage area with pre-identified pal or group, at the push of a button on your mobile or PDA



Affordable IMT-2000/3G The case for 450 MHz



Implementing IMT-2000 in the 450 MHz band

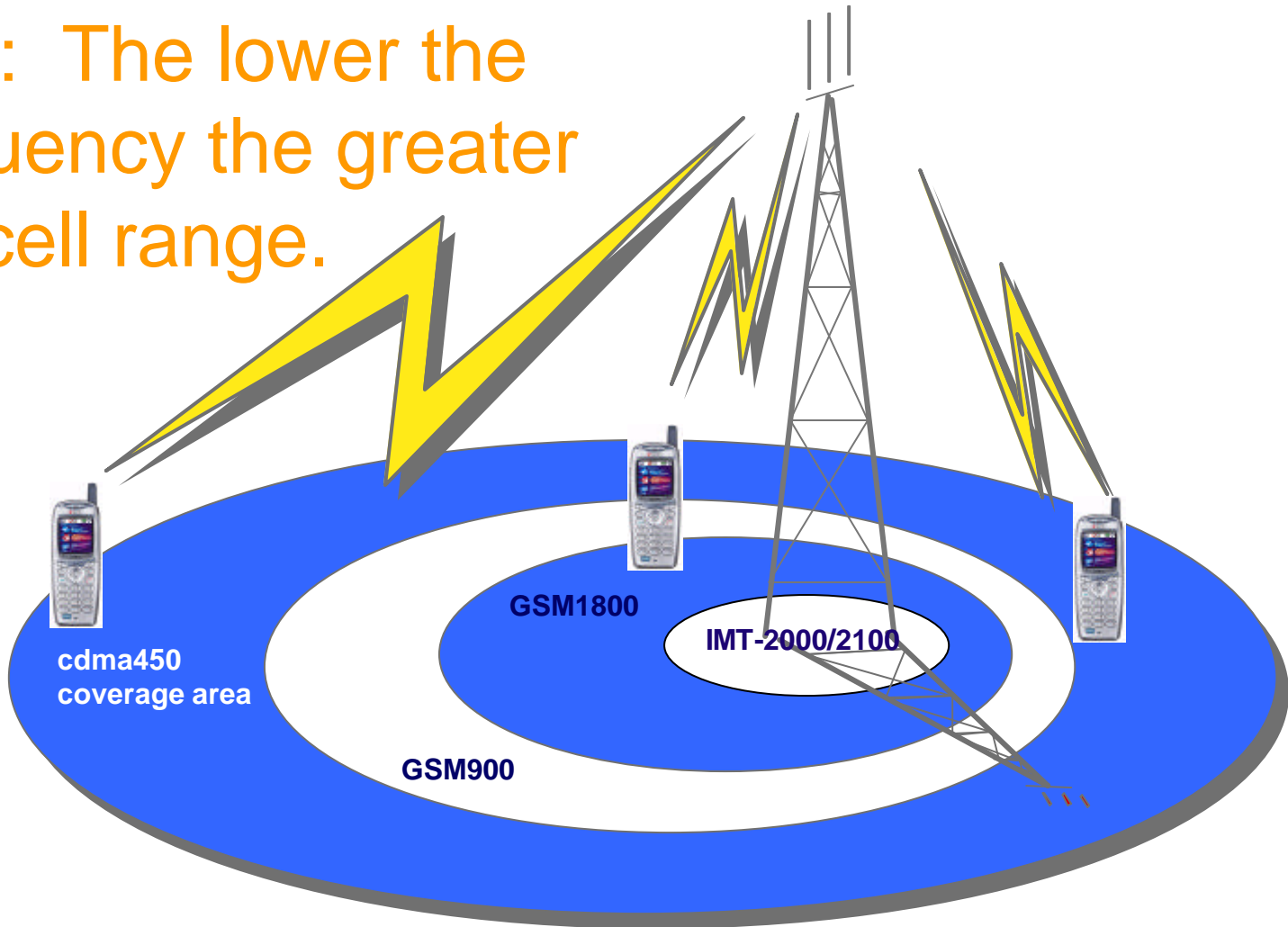
...CDMA450

- 450 MHz is good spectral “real estate”
 - *better propagation = fewer base stations*
- IMT-2000 provides mobile Internet access
- Many countries have 450MHz band licensed for mobile applications or available for licensing
- Timing coincides with first 3G availability
- About cdma450
 - cdma450 = CDMA2000 operating in the 450 MHz band
 - *cdma450 fully complies with ITU-R IMT-2000 Recommendations and detailed specifications*
- CDMA2000 is the only “CDMA” IMT-2000 radio interface that fits into the NMT450 licenses



Using RF Propagation to its best advantage

Fact: The lower the frequency the greater the cell range.



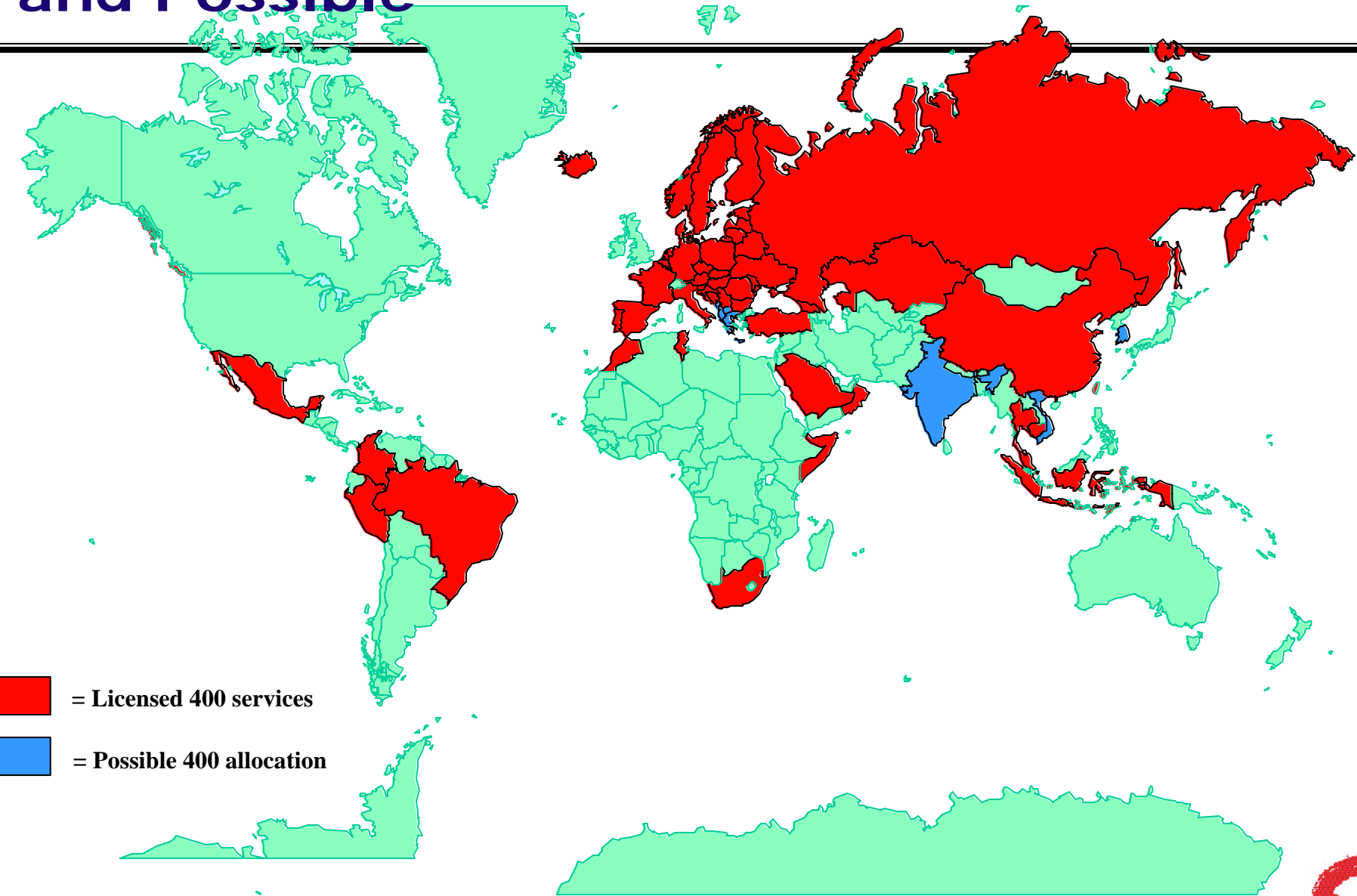
IS-2000 NMT-450 Band (Band Class 5) Frequency Plan



System Designator	Band Subclass	Transmit Frequency Band (MHz)	
		Mobile Station	Base Station
A*	0	452.500-457.475	462.500-467.475
B*	1	452.000-456.475	462.000-466.475
C	2	450.000-454.800	460.000-464.800
D	3	411.675-415.850	421.675-425.850
E	4	415.500-419.975	425.500-429.975
F	5	479.000-483.480	489.000-493.480
G	6	455.230-459.990	465.230-469.990
H*	7	451.310-455.730	461.310-465.730

* Current Product support

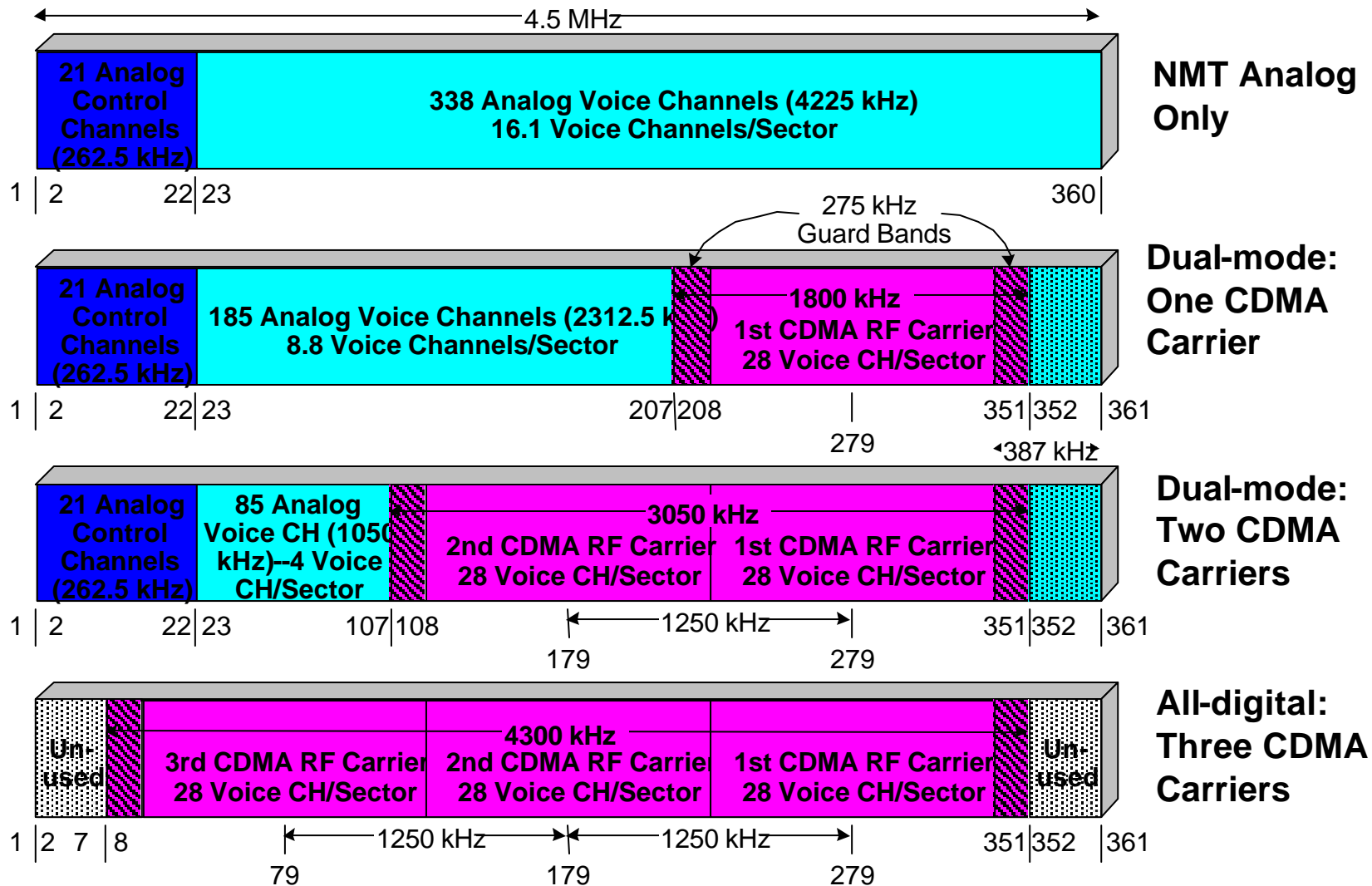


The 400 MHz Footprints: Past, Present, and Possible



 = Licensed 400 services
 = Possible 400 allocation

Frequency Migration Plan: CDMA can be overlaid over time onto an NMT network.



What are we to conclude?

- 1. Availability of “economical” 3G solutions (specifically rural coverage) will have positive economic and social impact**
- 2. Lower frequencies are the key to reducing infrastructure cost**
- 3. Both the 400 MHz and 800 MHz range have multiple bands available in many countries**

